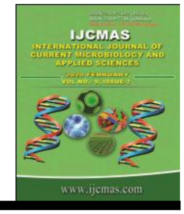
Int.J.Curr.Microbiol.App.Sci (2020) *9*(2): 619-625

EXCELLENT PUBLISHERS

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 9 Number 2 (2020)**
Journal homepage: http://www.ijcmas.com



Original Research Article https://doi.org/10.20546/ijcmas.2020.902.076

Correlation Studies and Path Analysis for Yield and Attributing Characters in Brinjal (*Solanum melongena* L.)

S. Vinutha Patil*, S. Gangaprasad and B. M. Dushyantha Kumar

Department of Genetics and Plant Breeding, College of Agriculture, Shivamogga University of Agricultural and Horticultural Science, Shivamogga, India

**Corresponding author*

Keywords

Association, Augmented design, Correlation, Residual effect, Trait

Article Info

Accepted:
08 January 2020
Available Online:
10 February 2020

A B S T R A C T

Top crosses of brinjal Bilichandubadane × mullugaibadane produced from F_1 generation were in augmented design at ZARS Shimogga in *Kharif* 2017. Evaluation of direction degree of associationand path coefficient analysis between yield and yield attributes traits was studies in brinjal (*Solanum longena* L.). Traits like days to first flowering, Number of fruits per plant, Number of flowers, Plant height, fruit width and fruit weight, fruit length, fruits per cluster were found to possess significant and positive correlation with fruit yield per plant and also showed positive direct effect in path co-efficient analysis. It was observed that with increase in plant height, there was corresponding increases of fruit yield per hectare. Number of branch per plant had significant negative association with fruit yield per plant. These characters play a major role in recombination breeding and suggested that direct selection based on these traits will be rewarded for crop improvement of brinjal.

Introduction

Brinjal (*Solanum melongena* L,) is one of the most common, widespread and principal vegetable crops grown in India and is also considered as king of vegetables. The crop is highly productive and known as the poor man's crop. It belongs to the family *Solanaceae* and is native of Indo-Burma region and China (Vavilov, 1926). It stands second in area and production after China and occupies an area of 6.69 lakh hectares with an annual production of 124.01 lakh metric tonnes and an average productivity of 19 tonnes per hectare (Anonymous, 2016). Brinjal occupies an area of 15.8 thousand hectares with an annual production of 4.03 lakh metric tonnes and productivity of 25.4 tonnes per hectare in Karnataka.

It ranks fair in nutritional value (carbohydrates, proteins, and fiber). It is an essential source of carbohydrate (4.0 g), protein (1.4 g), fiber (1.3 g), vitamin-A (124 IU), phosphorus (47 mg), potassium (2.0 mg) and iron (0.3 mg) and recommended for diabetes, asthma, cholera, bronchitis and it protects the brain cell membranes from damage.

Study of correlation between different quantitative characters provides an idea of association between yield attributing characters. Association of characteristics like yield, its components, and other economic traits is essential for making selection in the breeding programme. It suggests the advantage of a scheme of preference for more than one character at a time (Kalloo, 1994).The aim of the present study was to find out the association of characters between yield and yield components of brinjal.

Materials and Methods

The experiment consists of top two cross from F_1 including 1 checks from Private company seeds, from local market, Shivamogga. Crosses were made between as line × testes. Among them, top crosses were selected.

This experiment was conducted at ZAHRS, Shivamogga. Experimental material consisted of F_2population and checks. Sowing was carried out at 3rd week of July 2016. The seedlings were transplanted in main field after 22 days at a spacing of 90 cm between rows and 60 cm between plant to plant. Crop was raised by following recommended package of practices.

Portrays were filled with a mixture of vermicompost and coco peat; seeds were sown and watered. These portrays were covered with black polythene to build up humidity for better and early germination of seeds. After germination, polythene cover was removed, and watering was done either in the morning or evening hours. Main field was prepared to fine tilt by repeated ploughing and harrowing, and the FYM @ 25 t/ha was incorporated into the soil. Ridges and furrows were prepared at a spacing of 90 cm. Seedlings were planted on ridges at a spacing of 60 cm (*Anon.*, 2012). A total of 24 plants were planted on each ridge with a plot area of 6.75 m^2. A healthy crop was laid by adopting standard agronomic practices.

The correlation coefficient among all-important character combinations at phenotypic (rp) level were estimated by employing formula given by Al-Jibouri *et al.*, (1958).

$$\text{Correlation coefficient 'r'} = \frac{\text{Cov. (X.Y)}}{\sqrt{\text{(Var X) (Var Y)}}}$$

Where,

r= Simple correlation coefficient between variable X and Y

Cov(X.Y)= covariance of X and Y
Vx (P) = Phenotypic variance of character ‘x’
Vy (P) = Phenotypic variance of character ‘y’

$$\text{Phenotypic correlation} = r_{xy}(p) = \frac{Cov_{xy}(p)}{\sqrt{V_x(p)X}}$$

Where,

Covxy (P) = Phenotypic covariance between x and y characters
Vx (P) = Phenotypic variance of character ‘x.’
Vy (P) = Phenotypic variance of character ‘y.’

The test of significance for association between characters was done by comparing table ‘r’ values at n-2 error degrees of freedom for phenotypic and genotypic correlations with estimated values, respectively.

Path coefficient analysis

Path co-efficient analysis suggested by Wright (1921) and Dewey and Lu (1959) was carried out to know the direct and indirect effect of the morphological traits on fruit yield. The following set of simultaneous equations were formed and solved for estimating various direct and indirect effects.

r1y = a + r12b + r13c + ……………....+ r1Ii
r2y = a + r21a + b + r23c + ……………+ r2Ii
r3y = r31a + r32b + c + …………… + r3Ii
r1y = r11a + r12b + r13c + ……………..+ I

Where,

r1y to 11y = Co-efficient of correlation between causal factors 1 to 1 with dependent characters y.
r12 to r1I = Co-efficient of correlation among causal factors
a, b, c…i = Direct effects of characters 'a' to 'I' on the dependent character 'y.'

Residual effect (R) was computed as follows.

$$\text{Residual effect (R)} = 1 - \sqrt{a2 + b2 + c2 + \cdots i2 + 2abr12 + 2acr13 + \cdots}$$

Observations on quantitative characters were recorded for fruit yield and yield attributing traits *viz*., days to first flowering, days to fifty percent flowering, Plant height (cm), fruit length (cm), fruit width (cm), No. of branches, number of fruit, number of flower, fruit yield per plant (g).

Results and Discussion

The data generated in these observations was analyzed using WINDOSTAT 9.2 software. The correlation co-efficient between yield and yield components are shown in Table-1, Its improvement by direct selection is generally difficult because yield is governed by complex polygenic character largely influenced by its various component characters as well as by the environment. Hence, it becomes essential to estimate association of yield per plant with yield contributing characters and among themselves. The knowledge of magnitude and direction of correlation is used for judging how improvement in one character will cause simultaneous change in the other characters.

Data presented in Table 1 indicated at phenotypic level, the positive correlation with fruit yield per plant was recorded for days to first flowering at phenotypic levels (0.2955), fruit girth (0.3491), plant height (0.1563), number of flowers per plant (0.1503), number of fruits per plant (0.1503), fruit length (1913). Similar results were reported by Singh and Singh (1981); Dahatonde *et al.*, (2010) and Rajya Lakshmi *et al.*, (2014). A significant negative association for fruit yield per plant was observed with, number of branches per plant for phenotypic levels (0.0142) indicating that the association between these only one traits was negative. These results are in consonance with those reported by Singh and Kumar (2005) and Pathania *et al.*, (2005). Results indicated that these attributes were mainly influencing the yield of brinjal. This view was supported previously by Kalda *et al.*, (1996).

Path coefficients of component traits on yield

The correlation co-efficient between yield and a particular yield component was the net result of direct effect of that attribute and indirect effect through other yield contributing traits. Therefore, it is necessary to partition the total correlation coefficients into direct and indirect effect of cause as devised by Wright (1921). Path coefficient analysis provides an effective means of a critical examination of specific forces action to produce a given correlation and measure the relative importance of each factor.

Table.1 The Phenotypic correlation coefficient among yield components in brinjal

	DFF	FPF	PH	NOF	FPC	NOB	NOF	Fw	FI	FYP
DFF	**1**	0.5400***	0.2737***	0.2073**	0.0406	0.0118	0.2073**	0.4904***	0.1616	0.2955**
FPF		**1**	0.3391***	0.2501***	0.0729	0.1205	0.2501***	0.5535***	0.3271	0.2955**
PH			**1**	0.0407	0.0520	0.0406	0.0407	0.3739***	0.2303	0.3094**
NOF				**1**	-0.0678	0.0193	1.0000***	0.1503*	0.1169	0.1563*
FPC					**1**	0.1308	-0.0678	0.0824	-0.0273	0.1503*
NOB						**1**	0.0193	0.1301	-0.0215	-0.0436
NOF							**1**	0.1503*	0.1169	0.0142
Fw								**1**	0.2856	0.0142
fI									**1**	0.1503*
FYP										0.3491**

Table.2 The path coefficient among yield components in brinjal

	DFF	**FPF**	**PH**	**NOF**	**FPC**	**NOB**	**NOF**	**FW**	**FL**	**FYP**
DFF	**0.1136**	0.0614	0.0311	0.0235	0.0046	0.0013	0.0235	0.0557	0.0184	0.2955
FPF	0.0509	**0.0943**	0.032	0.0236	0.0069	0.0114	0.0236	0.0522	0.0308	0.3094
PH	-0.0019	-0.0024	**-0.007**	-0.0003	-0.0004	-0.0003	-0.0003	-0.0026	-0.0016	0.1593
NOF	0.0135	0.0163	0.0026	**0.0651**	-0.0044	0.0013	0.0651	0.0098	0.0076	0.1503
FPC	0.0012	0.0021	0.0015	-0.0019	**0.0285**	0.0037	-0.0019	0.0024	-0.0008	0.0436
NOB	-0.0007	-0.007	-0.0024	-0.0011	-0.0076	**-0.0585**	-0.0011	-0.0076	0.0013	-0.0142
NOF	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	**0.0001**	0.0001	0.0001	0.1503
Fw	0.1071	0.1208	0.0816	0.0328	0.018	0.0284	0.0328	**0.2183**	0.0624	0.3491
fI	0.0118	0.024	0.0169	0.0086	-0.002	-0.0016	0.0086	0.0209	**0.0733**	0.1913

In this analysis, fruit yield was taken as dependent variable, and the rest of the characters were considered as independent variables. Among the 9charactersstudied, number of flowers per plant (0.2955), number of fruits per plant (0.394), days to first flowering (0.2955), plant height (0.1593), number of fruits per plant (0.1503),fruit length (0.1913) and fruit width (0.3491)showed positive direct effect. Number of branch per plant recorded the negative direct effect (-0.0142). The direct selection for these characters would be beneficial for crop improvement since most of these characters also should have positive coefficient of correlation in improving the fruit yield per plant. Mohanty (1999); Mishra *et al.*, (2007) and Lohakare *et al.*, (2008) also have reported similar results in brinjal. The characters which recorded positive effect on yield had indirect positive impact via each other. Therefore, they do not affect each other adversely and hence, can be selected for improving the yield. In the present study, the residual path effect made a positive contribution (0.9145) which suggested that the characters which hold essential role in determining the total fruit yield are included in the present study. For the improvement of yield, emphasis should be made on all yield contributing characters which are influencing it directly or indirectly.

It is concluded in this study, days to first flowering at phenotypic levels, fruit girth, fruit length, plant height, number of flowers per plant, number of fruits per plant, plant height showed highly significant correlation with fruit yield per plant indicating, the direct effect of all above mentioned traits on fruit yield per plant favour yield improvement through selection that these characters can be used as surrogate characters for selecting high yielding genotypes. Hence, the correlation study conducted has revealed the characters that can be used for indirect selection in crop improvement programme.The direct effect of all above-mentioned traits on fruit yield per plant favor yield improvement through selection.

References

Al-Jibouri, H. A., Miller, P. A. and Robinson, H. F., 1958, Genotypic and environmental variances and co-variances in an upland cotton cross of Interspecific origin. *Agron. J*., 50: 633-636

Dahatonde, Kalpana, Dod, V.N., Nagre, P.K. and Wag, A.P. (2010). Correlation and path analysis in purple fruited brinjal. *Asian J. Hort.*, 5(2): 428-430.

Dewey, D. R. and Lu, K. H., 1959, A correlation and path coefficient analysis of components of wheatgrass seed production. *Agron. J*., 51:515-518.

Kalloo, G., 1994, *Veg. Breed*, Panima Educational Book Agency, New Delhi, p. 41.

Lohakare, A.S., Dod, V.M. and Peshattiwar, P.D. (2008).Correlation and path analysis studies in green fruited brinjal. *Asian J. Hort.,* 3(1): 173-175.

Mishra, S.V., Warade, S.D. and Nayakwadi, M.B. (2007). Correlation and path analysis in brinjal *.J. Maharashtra Agric. Univ.*, 32(1): 74-76.

Mohanty, B.K. (1999). Genetic variability, character association and path analysis in brinjal. *Prog. Hort.*, 31(1/2): 23- 28.

Pathania, N.K., Katoch, R. and Katoch, VIVEKA (2005). Correlation and path analysis for some biometrictraits in brinjal (*Solanum melongena* L.). *Ann. Biol.*, 21(2): 265-267.

Rajya Lakshmi, R., Padma, S.S. Vijaya, Naidu, L. Naram Andumajyothi, K. (2014). Correlation and path analysis studies on yield and yield components in brinjal. *Plant Archiv.,* 14(1) : 583-591.

Singh, S.N. and Singh, N.D. (1981). Correlation and path analysis in brinjal. *Prog. Hort.*, 13: 13-16.

Singh, Omar and Kumar, J. (2005). Variability, heritability and genetic advance in brinjal. *Indian J. Hort.*, 62(3): 265-267.

Srivastava, L. S. and Sachan, S. C. P., 1973, Variability study in brinjal (*Solanum meongoena* L.). *Indian J. Hort.*, 24: 89-90.

Vavilov, N. I., 1926, Studies on the origin of cultivated plants. *Bull. Appl. Bot*., 16: 2.

Wright, S. (1921). Correlation and causation. *J. Agri. Res.*, 20:557-587.

How to cite this article:

Vinutha Patil, S., S. Gangaprasad and Dushyantha Kumar, B. M. 2020. Correlation Studies and Path Analysis for Yield and Attributing Characters in Brinjal (*Solanum melongena* L.). *Int.J.Curr.Microbiol.App.Sci.* 9(02): 619-625. doi: https://doi.org/10.20546/ijcmas.2020.902.076